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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,537	07/25/2003	Gary L. Sugar	Cognio29US	3568

24374 7590 11/01/2005

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EXAMINER

NGUYEN, SIMON

ART UNIT PAPER NUMBER

2685

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,537

Applicant(s)

SUGAR ET AL.

Examiner

SIMON D. NGUYEN

Art Unit

2685

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 21 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 12, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Agee et al. (US 2004/0095907 A1).

Regarding claim 1, Agee discloses a MIMO communication system (fig.15) using eigenvectors of the channel to beam-form multiple signal between a first device and a second device with a power constraint application (paragraphs 71, 192, 193, 287, 500).

Regarding claims 12, 22, these claims are rejected for the same reason as set forth in claim 1, wherein Agee further discloses a processor (figs.15, paragraph 469).

3. Claims 1, 12, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Walton et al. (US 2003/0125040 A1).

Regarding claim 1, Walton discloses a MIMO communication system (figs. 2-4) using eigenvectors of the channel to beam-form multiple signal between a first device

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and a second device with a power constraint application (paragraphs 120, 122, 256-259, 263-264, 459).

Regarding claims 12, 22, these claims are rejected for the same reason as set forth in claim 1, wherein Walton further discloses a processor and components in the first device and the second device (figs.2-4).

4. Claims 1, 12, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Sampath (US 2003/0043929 A1).

Regarding claim 1, Sampath discloses a MIMO communication system (figs. 3-5) using eigenvectors of the channel to beam-form multiple signal between a first device and a second device with a power constraint application (paragraphs 26-28, 64-65, 89-90, 94).

Regarding claims 12, 22, these claims are rejected for the same reason as set forth in claim 1, wherein Sampath further discloses a processor and components in the first device and the second device (figs.3-5).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benesty et al. (US 2004/0013212 A1) in view of Raleigh (6,377,631)

Regarding claim 1, Benesty discloses method and apparatus for communication between a first device (10) having M plurality of antennas (13) and a second device (15) having N plurality of antennas (16), comprising a step of processing a vector s representing signals with a transmit matrix H that is computed to maximize capacity of the channel between the first device and the second device subject to a power that the power emitted by each of the N plurality of antennas is less than or equal to a maximum power, whereby the transmit matrix H distributes the signals among the M plurality of antennas for simultaneous (training sequence) transmission to the second device (figs.1-3, page 2 paragraph 15 to page 3 paragraph 37). However, Benesty does not specifically disclose a power constraint transmitted along with eigenvectors.

Raleigh discloses a power constraint transmitted along with eigenvectors (column 27 line 48 to column 28 line 16, column 6 line 57 to column 7 line 23, column 22 line 5-15, column 34 line 67 to column 35 line 10). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have Benesty, modified by Raleigh in order to improve the system performance in a MIMO system.

Regarding claim 12, this claim is rejected for the same reason as set forth in claim 1, wherein Benesty further discloses a processor (paragraphs 106, 164, 165)

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wherein the processor is inherently a baseband signal processor in the transmitters of Benesty.

Regarding claim 22, this claim is rejected for the same reason as set forth in claims 1 and 12, wherein Benesty further discloses a second device comprising a plurality of antennas, a plurality of receivers, a baseband signal processor, wherein the processor receiving weights and combining the resulting signal to recover the signals (figs. 1-3, page 2 paragraph 16 to page 3 paragraph 37, claims 8-9).

Regarding claims 3, 14, 24, Benesty further discloses the power held constantly for the plurality of antennas (page 3 paragraphs 26-27).

Regarding claim 10-11, 21, Benesty further discloses a second device of receiving at the N plurality of antennas signals transmitted by the first device, and processing signals received at each of the plurality of n antennas with receive weights and combining the resulting signals to recover the signals wherein the step of processing comprises multiplying the vector s with a transmit matrix $A(k)$ at each of a plurality of sub-carriers k (figs.1-3, page 2 paragraph 17, page 3 paragraph 36-37).

Regarding claims 2,13, 23, Benesty does not specifically disclose computing the power constraint being different for one or more of the N plurality of antennas.

Raleigh, in the same field of invention, discloses processing a vector with a transmit matrix signal that is computed subject to the power constraint being different for one or more of the N plurality of antennas (figs.11-20, column 6 line 57 to column 7 line 23, column 24 line 16 to column 27 line 65). Therefore, it would have been obvious to one

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skilled in the art at the time the invention was made to have Benesty, modified by Raleigh to control a SNR in order to get a desired transmission signal at the receiver.

Regarding claims 4, 15, 25, Benesty further discloses processing the vector s with the transmit matrix H that is computed subject to the power constraint for each of the M plurality of antennas being equal to a total maximum power emitted by all of the M plurality of antennas combined divided by M (page 3 paragraphs 26-27).

Regarding claims 5-9, 16-20, 26, Benesty further discloses multiplying the vector s with the transmit matrix H , such that the power transmitted by each of the M antennas is the same and equal (page 3 paragraph 26 -34, page 6 paragraph 100 to page 7 paragraph 115) when $N > M$ (paragraph 32), and a total power to be divided equal to the transmit matrix (page 3 paragraph 26-27). However, Benesty does not specifically disclose an eigenvector matrix HHH .

Raleigh discloses an eigenvector matrix HHH (column 19 line 57 to column 20 line 20, column 22 lines 19-23). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have Benesty, modified by Raleigh to control the transmission power in order to prevent the interference.

Response to Arguments

7. Applicant's arguments filed 4/4/05 have been fully considered but they are not persuasive.

In Remarks, the applicant states that the prior art of Benesty and Raleigh fail to suggest or teach the power constraint use in the eigenvectors of the channels to beamform multiple signals between a first device and a second device.

The examiner disagrees for the following reasons: the prior art issued to Raleigh alone teaches all features as claimed, where Raleigh discloses a MIMO system, in which the transmitter weight matrix selects spatial directions that maximize the average received power for the chosen number of spatial direction, to maximize average received power subject to constraints on the average interference power radiated to unintentional receiver which optimizes the transmission matrix (column 27 line 48 to column 28 line 16) wherein the TSP direction is chosen for all SOP bins that transmits the maximum amount of power to the desired receiver while maintaining a transmit power limit and a transmitted interference limit, therefore, the TSP is equal to the maximum generalized eigenvector of the matrix, and wherein the RSP that mazes SINR is the maximum eigenvector (column 21 line 35 to column 22 line 28, column 19 line 22 to column 20 line 51) . Therefore, Raleigh indeed teaches the power constrain use in the eigenvectors to average power from a transmitter (first device)(TSP or TSW) to a receiver (second device) (RSP or RSW).

Furthermore, The new cited prior art issued to Agee et al. , Walton et al., and Sampath also teach MIMO systems using eigenvectors of the channel to beam-form multiple signals between a first device and a second device with a power constraint application.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Simon Nguyen whose telephone number is (571) 272-7894. The examiner can normally be reached on Monday-Friday from 7:00 AM to 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban, can be reached on (571) 272-7899.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 306-0377.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
600 Dulany, Alexandria, VA 22314

Or faxed to:

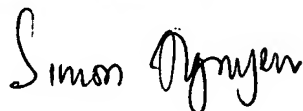
(571) 273-8300 (for formal communications intended for entry)

Hand-delivered response should be brought to Customer Service Window located at the Randolph Building, 401 Dulany, Alexandria, VA, 22314.

Simon Nguyen

October 20, 2005

**SIMON NGUYEN
PRIMARY EXAMINER**

A handwritten signature in cursive script that reads "Simon Nguyen".